

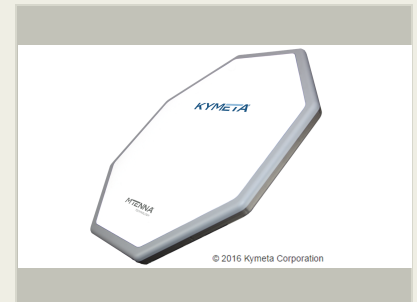
Low-SWAP Ka-band Antenna for Inter-Satellite Links, Phase I

Completed Technology Project (2017 - 2017)



Project Introduction

Kymeta Government Solutions (KGS) proposes to apply technology and manufacturing advancements developed by Kymeta Corporation to produce a low-SWAP-C metamaterial antenna that is intended to operate in the inter-satellite link frequency bands between 22.55-23.55 GHz and 25.25-27.5 GHz. This antenna will leverage TFT technology, which is used to build flat panel computer monitors, television screens, and smart phone displays, to tune the radiating elements of the aperture. This technology allows for the manufacture of a single aperture that can be tuned to operate on two separate frequencies, allowing for simultaneous transmit and receive. The transmit and receive beams can be controlled individually, allowing each to have its own frequency, pointing angle, and polarization. This technology allows the use of one antenna where two are typically required, resulting in dramatic size, weight, power, and cost benefits to the platform. Kymeta has built dual frequency antennas using this technology ranging in frequency from Ku-band (11 GHz) to Ka-band (30 GHz) and in aperture diameters ranging from 20 cm to 70 cm. This antenna is well suited for 12U or larger platforms which benefit from simultaneous transmit and receive, wide scan range, fast scanning rates, and the ability to dynamically update the polarization of the antenna. KGS objectives for the Phase I effort are: (1) Identify requirements for a low-SWAP Ka-band ISL antenna for small spacecraft, and (2) perform modeling, analysis, and conceptual design for a dual frequency antenna that operates in both the TDRSS forward and return link bands. This analysis will result in performance predictions for the dual frequency antenna which will be used to determine whether a dual frequency aperture or two single frequency apertures are the best solution to meet mission requirements. If this project is selected for a Phase II award, Phase II will complete design and fabrication of the selected antenna solution.



Low-SWAP Ka-band Antenna for Inter-Satellite Links, Phase I Briefing Chart Image

Table of Contents

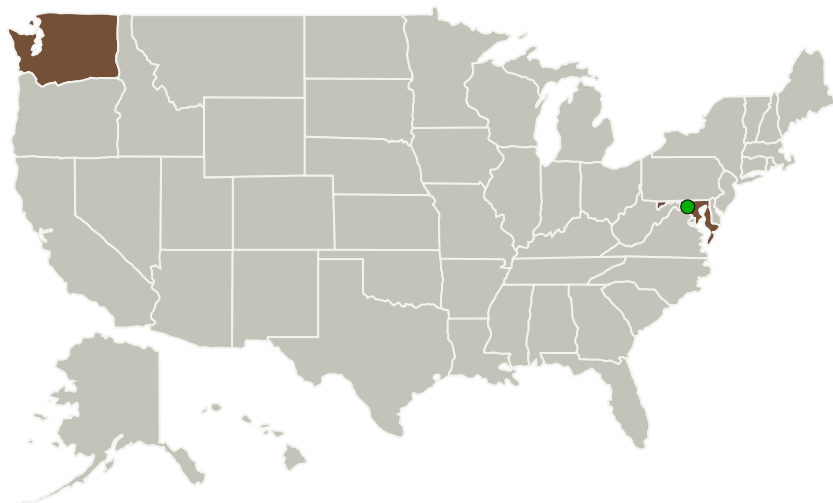
| | |
|--|---|
| Project Introduction | 1 |
| Primary U.S. Work Locations and Key Partners | 2 |
| Project Transitions | 2 |
| Organizational Responsibility | 2 |
| Project Management | 2 |
| Technology Maturity (TRL) | 2 |
| Images | 3 |
| Technology Areas | 3 |
| Target Destinations | 3 |

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Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|-------------------------------------|-------------------------|-------------|---------------------|
| Kymeta Government Solutions | Lead Organization | Industry | Redmond, Washington |
| ● Goddard Space Flight Center(GSFC) | Supporting Organization | NASA Center | Greenbelt, Maryland |

Primary U.S. Work Locations

| | |
|----------|------------|
| Maryland | Washington |
|----------|------------|

Project Transitions

June 2017: Project Start

December 2017: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140825>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Kymeta Government Solutions

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

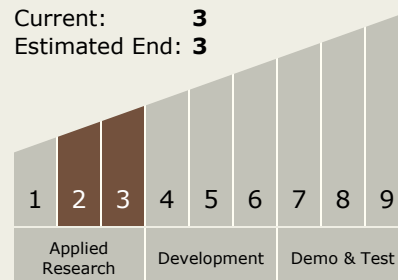
Carlos Torrez

Principal Investigator:

Margaret R Godon

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Images



Briefing Chart Image

Low-SWAP Ka-band Antenna for
Inter-Satellite Links, Phase I

Briefing Chart Image

(<https://techport.nasa.gov/image/126301>)

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.2 Radio Frequency
 - └ TX05.2.6 Innovative Antennas

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System